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ACUTE LYMPHOBLASTIC LEUKEMIA BLOOD CELL IMAGE CLASSIFICATION USING CONVOLUTIONAL NEURAL NETWORK

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Leukemia can be defined as blood cancer that occurs in bone marrow due to uncontrollable production of white blood cell. Manual diagnosis by using microscopic images is time consuming and error prone. A throughout and accurate diagnosis can be obtained by using the integration of artificial intelligence (AI) to assist haematologist in diagnosis. The objective of this study is to propose a deep learning-based method using convolutional neural network (CNN) for accurate diagnosis of acute lymphoblastic leukemia (ALL) dataset. The method starts by doing data collection process from HUSM. After that, the collected images undergo the pre-processing of data resizing and data augmentation. Next, three most common CNN models which are AlexNet, VGG-16 and ResNet-18 are developed for detection and classification of ALL and the best performance of the model is selected for the next process which is hyperparameter tuning. During the process of hyperparameter tuning, optimizers, initial learning rate, mini batch size and learning rate drop factor are varies. Finally, performance metrics for classification are used to evaluate the performance of the model that includes accuracy, precision, sensitivity and F1-score. The result shows that ResNet-18 achieved the best performance and hyperparameter tuning optimized the model to have performance of 99.56%, 99.71%, 99.60% and 99.56% for accuracy, precision, sensitivity and F1-score respectively. This selected model is proposed to be integrated into computer-based diagnosis (CAD) system that can be used to assist haematologist in detecting and classifying ALL from microscopic blood sample images.

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